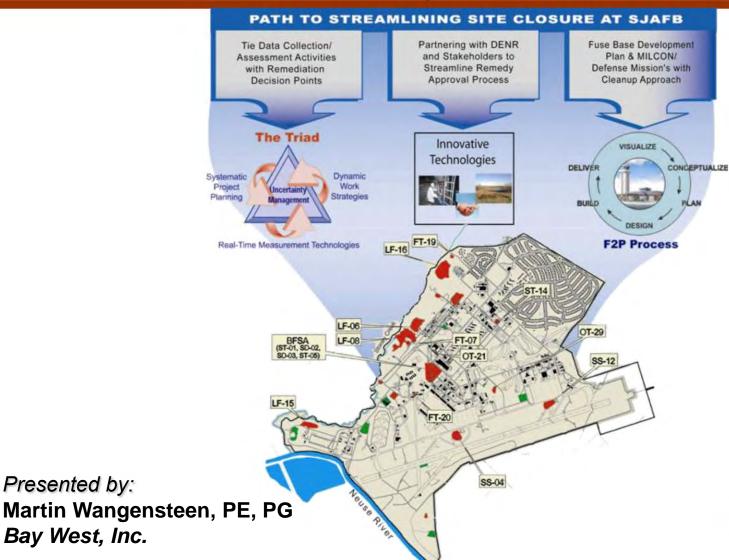
The Use of Future First Planning, the Triad, and **Performance-Based Contracting to Accelerate** Site Closure at Seymour Johnson AFB



Bay West

Presented by:

Bay West, Inc.

maintaining the data needed, and c including suggestions for reducing	lection of information is estimated to ompleting and reviewing the collect this burden, to Washington Headqu uld be aware that notwithstanding an DMB control number.	ion of information. Send comments arters Services, Directorate for Information	regarding this burden estimate of mation Operations and Reports	or any other aspect of the 1215 Jefferson Davis	is collection of information, Highway, Suite 1204, Arlington		
1. REPORT DATE MAY 2009		2. REPORT TYPE		3. DATES COVE 00-00-2009	red to 00-00-2009		
4. TITLE AND SUBTITLE					5a. CONTRACT NUMBER		
The Use of Future First Planning, the Triad, and Performance-Based Contracting to Accelerate Site Closure at Seymour Johnson AFB					5b. GRANT NUMBER		
					5c. PROGRAM ELEMENT NUMBER		
6. AUTHOR(S)					5d. PROJECT NUMBER		
					5e. TASK NUMBER		
			5f. WORK UNIT NUMBER				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Bay West, Inc,5 Empire Drive,St. Paul,MN,55103				8. PERFORMING ORGANIZATION REPORT NUMBER			
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)					10. SPONSOR/MONITOR'S ACRONYM(S)		
				11. SPONSOR/M NUMBER(S)	ONITOR'S REPORT		
12. DISTRIBUTION/AVAII Approved for publ	LABILITY STATEMENT ic release; distributi	on unlimited					
13. SUPPLEMENTARY NO	OTES						
	DIA Environment, I		_		um & Exhibition		
held 4-7 May 2009	in Denver, CO. U.S.	. Government or Fe	deral Rights Lice	nse			
14. ABSTRACT							
15. SUBJECT TERMS							
16. SECURITY CLASSIFIC		17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON			
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified	Same as Report (SAR)	35	ALSI ONSIBLE I ENSON		

Report Documentation Page

Form Approved OMB No. 0704-0188



Authors

- Martin Wangensteen, PE, PG
 - Bay West, Inc.
- Frank Werner, PE
 - Seymour Johnson AFB
- John Cataldo, PE
 - USACE Omaha District
- Megan Kari, PE
 - NewFields, LLC









Acknowledgements

- USAF/Air Combat Command
 - Margaret Patterson
 - Bob Barrett, PE
- Seymour Johnson AFB
 - Buck Abrams, PE
- USACE Omaha District

- Teaming PartnersSubcontractors
 - SAIC
 - URS
 - TN&A
- NewFields
 - Kandi Brown
- NCDENR
 - Beth Hartzell









Contract Overview

SITE NAME	SITE CLOSURE DEADLINE	CURRENT STATUS		
F-15 Ramp	MAY 2010	SITE CLOSURE DEC 2008		
Radar Tower Site	MAY 2010	REMEDIAL ACTION OPERATIONS		
	DEC 2010	REMEDIAL ACTION OPERATIONS		
Bulk Fuel Storage	DEC 2010	SITE CLOSURE MAY 2006		
Area (BFSA)	DEC 2010	SITE CLOSURE MAY 2006		
	DEC 2010	REMEDIAL ACTION OPERATIONS		
KC-135 Ramp	DEC 2010	REMEDIAL ACTION OPERATIONS		
BX Service Station	NOV 2011	SITE CLOSURE FEB 2007		
Fire Training Area No. 3	NOV 2011	REMEDIAL ACTION OPERATIONS		
Fire Training Area No. 1	NOV 2011	SITE CLOSURE JULY 2007		
Fire Training Area No. 2	DEC 2010	SITE CLOSURE OCT 2006		
Old Entomology Shop	DEC 2010	SITE CLOSURE DEC 2008		
Landfill No. 4	DEC 2010	SITE CLOSURE NOV 2007		
Landfill No. 1	DEC 2010	SITE CLOSURE NOV 2007		
Landfill No. 2	NOV 2011	SITE CLOSURE NOV 2007		
Landfill No. 3	NOV 2011	SITE CLOSURE NOV 2007		



Regulatory Framework

- Regulatory oversight performed through three NCDENR regulatory programs:
 - ➤ Underground Storage Tank (UST) Program: SS-04, SS-12, ST-14 and BFSA (ST-01, SD-02, SD-03, ST-05)
 - Inactive Hazardous Sites Branch (IHSB) Program: FT-07, FT-19, FT-20, OT-21, OT-29
 - RCRA Program (Landfill) Sites: LF-06, LF-08, LF-15, LF-16



Exit/Closure Strategy

Exit/Closure Strategy Based on a Marriage of:

- Future First Planning
- > Triad
- Innovative Technologies
- Remedial Process Optimization
- Decision-Based Partnering

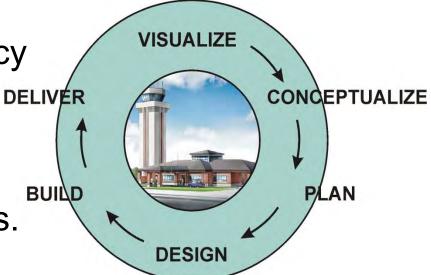


Future First Planning

Future First Planning (F2P):

A process that fuses Base development planning with environmental cleanup to optimize land use.

➤ Represents a shift in policy where environmental per restoration sites are viewed as potential assets instead of liabilities.

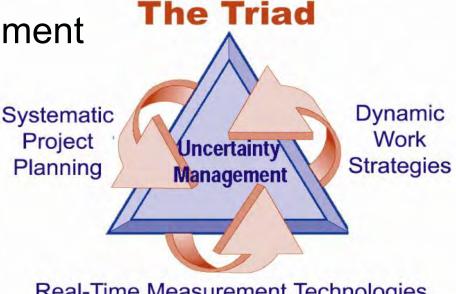




The Triad

- Uncertainty Management through the Triad:
 - Systematic Project Planning
 - Dynamic Work Strategies

Real Time Measurement **Technologies**



Real-Time Measurement Technologies



SJAFB Triad Elements

Systematic Project Planning:

- Developed preliminary Conceptual Site Model (CSM) using data from past investigations
- Evaluated real time analytics and feasibility of use based on anticipated in-field decisions
- Incorporated potential remediation approaches into data collection techniques
- Cost savings realized through reduced mobilizations

SJAFB Triad Elements (cont.)

Bay West

Dynamic Work Strategies:

- Decision Trees allowed in field decision-making, preventing equipment down-time and reducing fixed-lab costs
- Flexible work plan allowed changes to occur when the CSM changed
- Iteratively updating the CSM and continuously adapting the investigative strategy helped to reduce uncertainty and allow for full characterization of the site

SJAFB Triad Elements (cont.) Bay West

Real Time Measurement Technologies:

- Real time data used to update the CSM throughout the investigation for continuous use to direct additional data collection
- ➤ Electronic data (CPT data, stratigraphic logs, LIF data) produced/transmitted daily and posted to Bay West's web site for access/review by Client
- ➤ Real Time Measurement allowed the Team and stakeholders to make informed, quantitative site decisions while in the field

OT-29



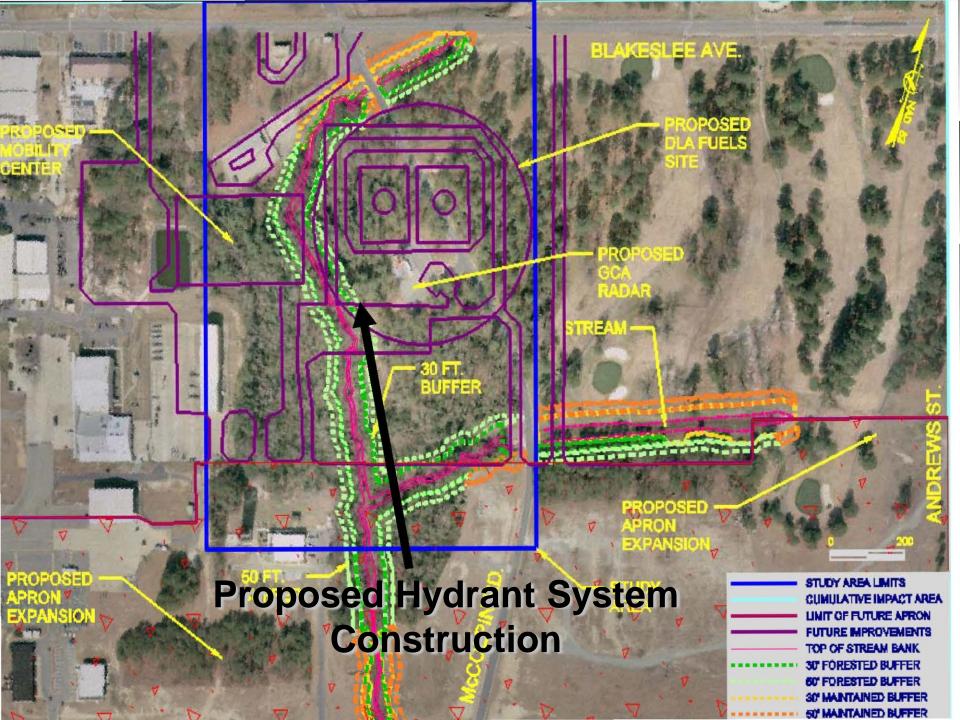


Overview

- Pending Mission Critical fuel hydrant system
- Mixed plume of petroleum hydrocarbons and chlorinated hydrocarbons
- Original system installed as Interim Remedial Action
- 1998 construction completed and system started

Original System

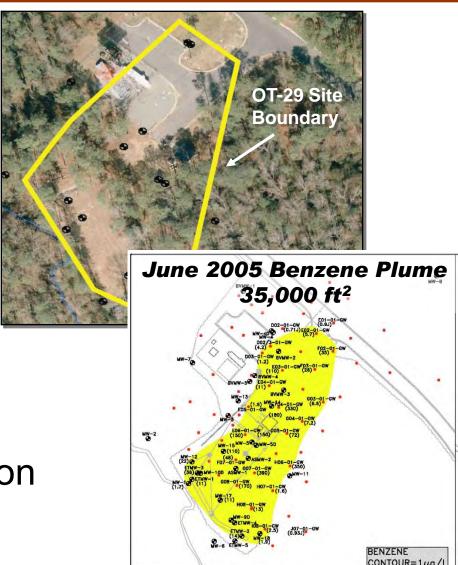
- Biosparge/biovent wells & groundwater extraction trench
- Projected cleanup >20 yrs



OT-29Cleanup Strategy

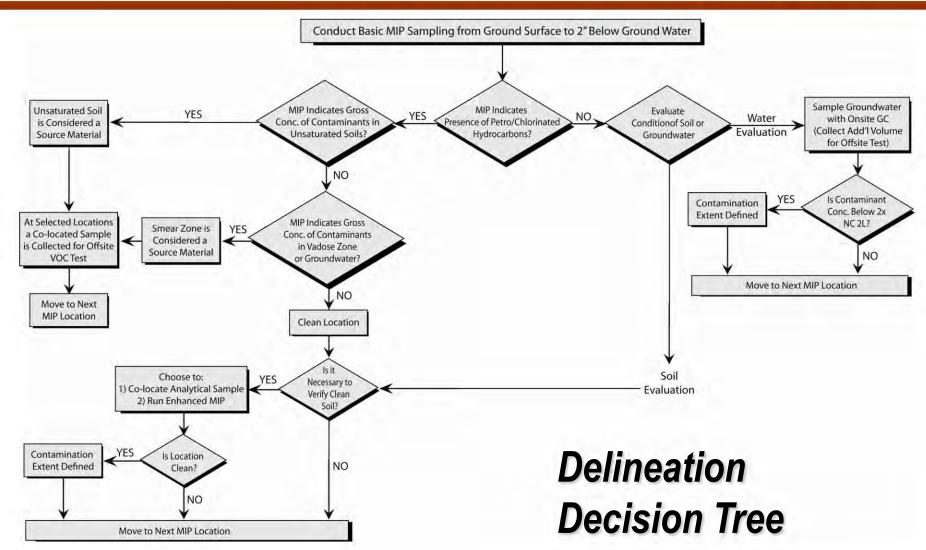


- Site characterization utilizing the Triad
- Removal of residual LNAPL using surfactant flush and recovery
- Excavation of contaminated soils
- © Groundwater treatment through chemical oxidation events



OT-29Dynamic Work Strategies





OT-29

Characterization Actions Performed





- Membrane Interface Probe Characterization
 - > 55 points analyzed
 - MIP enabled determination of source area and extents
- Rapid Analysis
 - Soil and groundwater samples used to correlate data with MIP
 - PID headspace analysis performed on potentially contaminated soil

OT-29Surfactant Injection

Field Activities:

- Installed temporary injection points within targeted LNAPL area based on Triad results
- Injected 10,000 gal of 1.6% non-ionic surfactant (1,250 gal/well)
- Used MMPE to recover surfactant and >700 gal of petroleum product
- Work completed in 2 weeks







OT-29"Hot Spot" Excavation





TCE Source Removal Adjacent to Radar Tower

- Source removal of 2,000 tons of impacted soil
- Excavation extents basedon Triad delineation results– soil removed from 2 areas

OT-29Biopile Construction



Actions Completed:

- Constructed biopile to treat petroleum/VOC-impacted soil on-site
- Biopile actively vented and moisture content managed
- Highly-impacted soil amended with approx 1,000 gal hydrogen peroxide (12 wt %) & tilled
- Beneficial reuse of cover material for local landfill following treatment



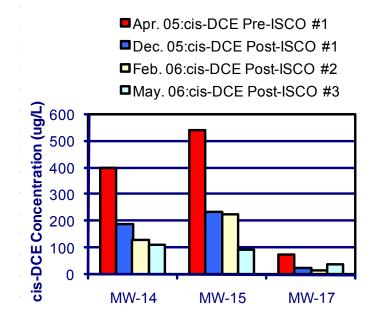
	NCDENR Unrestricted (mg/kg)	Jan. 2005 (mg/kg)	Oct. 2005 (mg/kg)
Benzene	0.006	0.003	ND
Toluene	7.3	0.5	ND
Ethylbenzene	0.24	5.14	0.002
Xylenes	5	31.9	0.03
Aliph. C5-C8	72	659	28
Aliph. C9-C18	3,260	484	910
Aliph. C19-C36		271	71
Arom. C9-C22	34	819	355

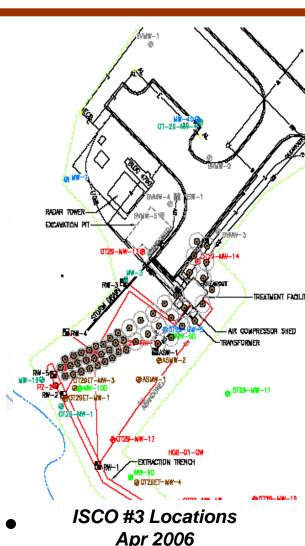
OT-29 In Situ Chemical Oxidation



Actions Completed:

- ISCO Bench Scale Tests (modified Fenton's)
- 3 ISCO events w/287 injection points and approx 75,000 gal oxidizer/catalyst over





OT-29Current Status



- Site remediation activities completed with no impact to the mission-critical fuel hydrant system construction
- Awaiting NCDENR concurrence on No Further Active Remediation Status
- Cleanup timeframe reduced from 20+ years to 4 years
- Projected Savings to Government in excess of \$1.5M

Bulk Fuel Storage Area (BFSA) Bay West

Setting:

- ➤ 400,000-gal jet fuel (JP-4) release (>50,000 gal in subsurface requiring cleanup)
- Estimated 29,000 ft² LNAPL plume
- Estimated 395,000 ft² dissolved plume
- Legacy treatment system installed in 1998



BFSACleanup Strategy



- Optimize legacy treatment system to maximize performance prior to design and installation of updated recovery system
- Perform Triad-based characterization to expedite plume definition
- Design, install, and operate enhanced recovery system

BSFATriad LIF/CPT ROST Investigation



- Rapid Optical Screening Tool (ROST) used for simultaneous collection of LIF and CPT data
- Data collection provided integrated 3D investigation and mapping of LNAPL and smear-zone vadose soils
- 9-day field effort with collection of 98 borings with minimal disturbance to AF mission
- Decision Tree utilized to direct field activities

BSFAReal Time Data Collection



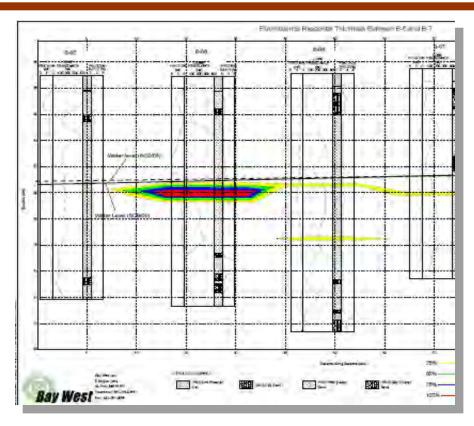




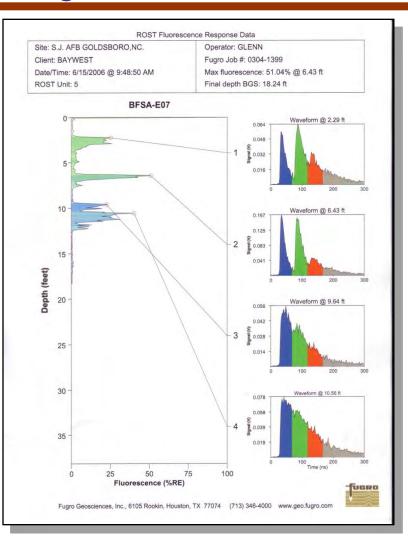
BSFA

Data Rendering



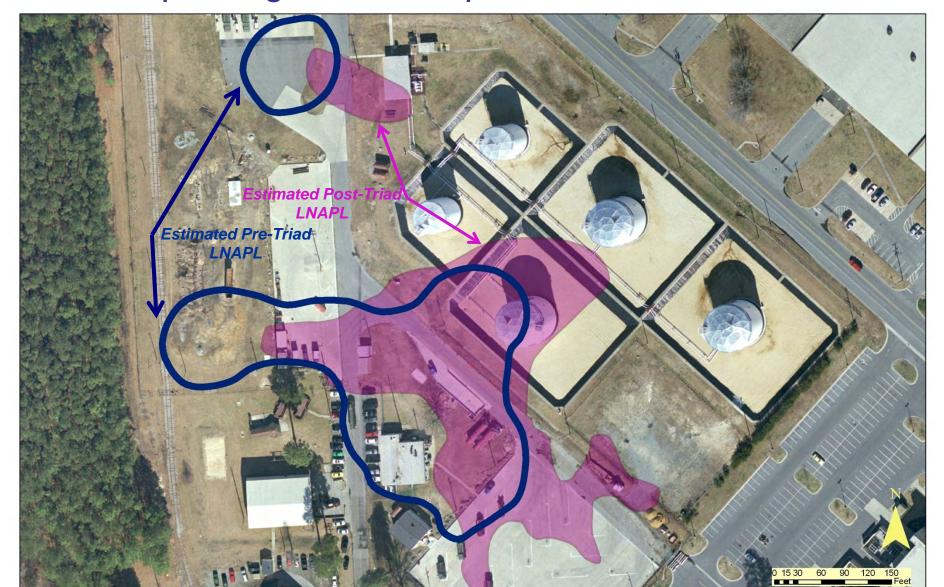


CPT & LIF Data









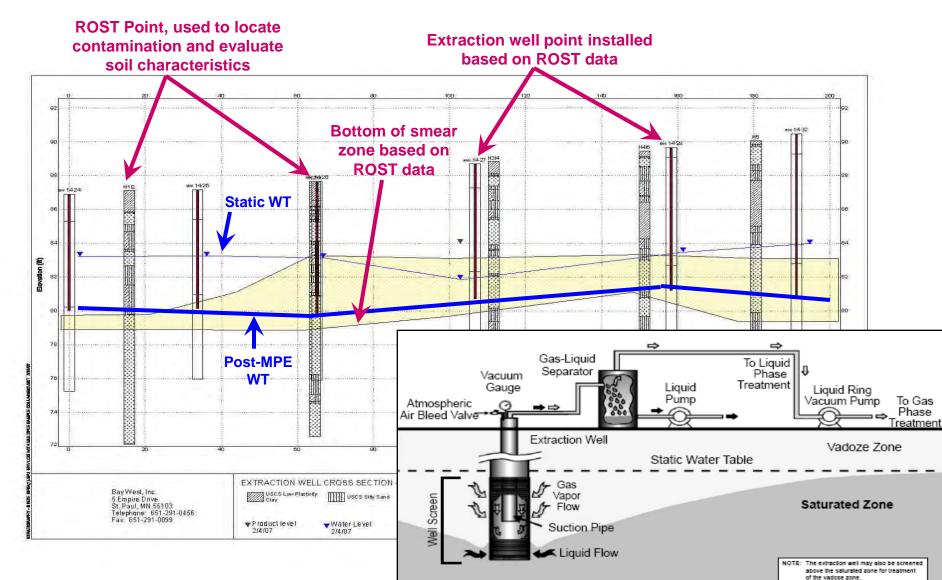
BFSATreatment System Expansion



- Installation of 65 MPE wells in target areas identified during the Triad investigation
- Horizontal drilling and installation of system piping (~3,000 linear ft) to minimize impact to high-traffic, mission critical site area
- Installation/Integration of 650-cfm extraction skid to increase recovery volume as estimated from the 3D site models

System Enhancement













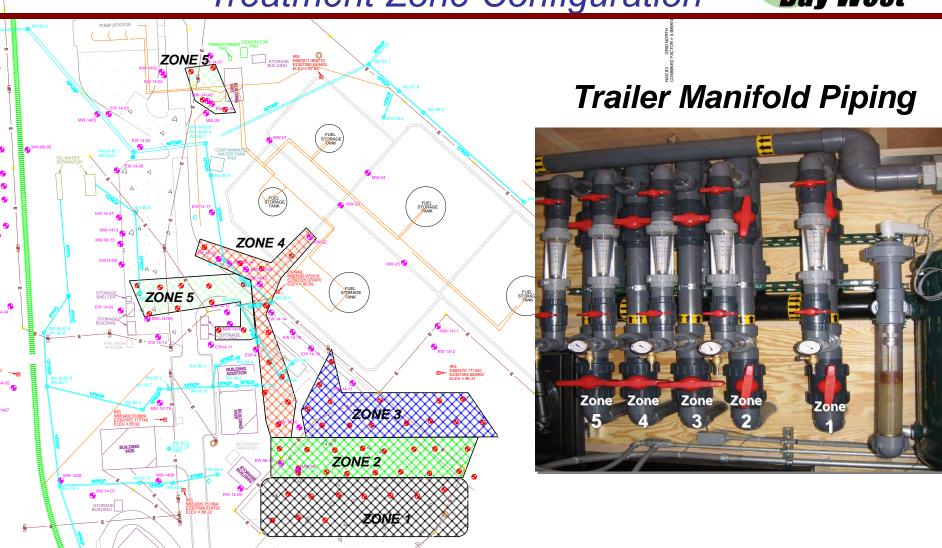
Isolation/
Bypass Valve

Air Velocity Site Tube

Well Field Operation Valve







BFSA *MPE Trailer System*





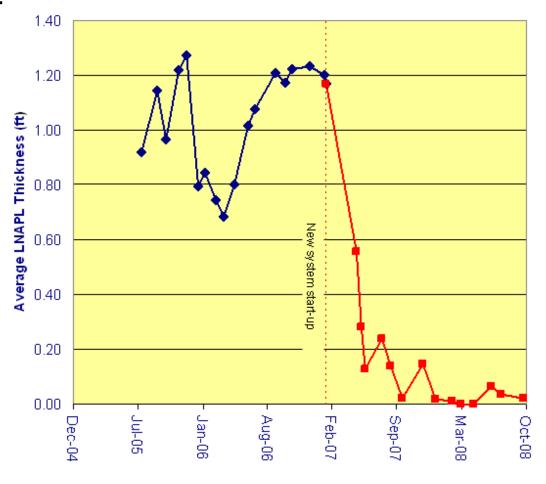
BFSA Current Status



- MPE targeting of Triad-defined LNAPL removed approx 50,000 gal of LNAPL in 12-month period
- © Cleanup timeframe estimated to be reduced from 10+ years to 3.5 years

Average LNAPL Thickness

MW-1414S, MW-1415S, MW-1416S, MW-96-14, RW-14-10, MW-22, MW-28



Summary



- Triad reduced:
 - Number of mobilizations & fixed-base lab costs
 - Field and reporting efforts
 - Time to design and implement remedial action enhancements
- Provided data to revise CSM reflecting:
 - More accurate LNAPL distribution (vertical and horizontal)
 - Soil impacts below regulatory criteria
 - Role of stratigraphy in contaminant transport/recovery
- Resulted in a design targeting source and "hot-spot" areas, reducing cleanup time

Thank You

Presented by:

Martin Wangensteen, PE, PG Bay West, Inc.

Direct: 651-291-3475

Cell: 651-341-3265

martyw@baywest.com

